

# GMAT Algebra: Fundamentals

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## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Difficulty Levels</b>	<b>3</b>
<b>3</b>	<b>Problem Solving</b>	<b>4</b>
<b>4</b>	<b>Data Sufficiency</b>	<b>15</b>
<b>5</b>	<b>Answer Key</b>	<b>21</b>
<b>6</b>	<b>Explanations</b>	<b>24</b>

## 1 Introduction

This document contains nothing but GMAT Algebra questions—100 of them, to be exact. They are designed to build your skills on some of the most important topics on the GMAT. Algebraic topics such as isolating a variable, solving a quadratic, and managing exponents and roots are not only key components of GMAT Algebra problems, but they underpin a wide range of questions from word problems to geometry to number properties.

As in all of my GMAT preparation resources, you'll find these questions indexed by difficulty.

For further, more specific practice, I have produced several other resources that may help you. Just about every subject covered on the GMAT has something to do with Algebra, but the group that has the most in common are Word Problems. Many students find that translating Word Problems to Algebra is one of the biggest challenges on the test. If you find yourself in that group, try my "Word Problems: Fundamentals" set, or give a try to "Ratios, Rates, and Percents," which focuses solely on those three content areas.

Also, The GMAT Math Bible has several chapters (along with focused practice) on Algebra and related issues, including individual chapters on fractions, decimals, simplifying expressions, linear equations, systems of equations, quadratic equations, inequalities, absolute value, exponents, roots, and more. If you find you are struggling with the mechanics of these problems, your time is probably better spent with the GMAT Math Bible than in doing dozens and dozens of practice problems, hoping to pick up those skills along the way.

There are plenty of articles at GMAT HACKS to help you with your strategic approach to GMAT Math questions. Most importantly, you should make sure you understand every practice problem you do. It doesn't matter if you get it right the first time—what matters is whether you'll get it right the next time you see it, because the next time you see it could be on the GMAT.

With that in mind, carefully analyze the explanations. Redo questions that took you too long the first time around. Review questions over multiple sessions, rather than cramming for eight hours straight each Saturday. These basic study skills may not feel like the key to GMAT preparation, but they are the difference between those people who reach their score goals and those who never do.

Enough talking; there are 100 Algebra questions waiting inside. Get to work!

## 2 Difficulty Levels

In general, the level 5 questions in this guide are 500- to 560-level questions. The level 4 questions represent a broad range of difficulty from about 380 to 500, while the level 3 questions are lower.

### **Easy (3)**

PS

3, 17, 26

DS

66, 98

### **Moderately Easy (4)**

PS

2, 5, 6, 8, 20, 24, 25, 28, 31, 34, 35, 36, 37, 41, 45, 47

DS

52, 55, 57, 59, 60, 62, 64, 65, 67, 68, 69, 71, 72, 73, 74, 76, 77, 81, 82, 83, 84,  
85, 88, 89, 91, 92, 93, 94, 95, 96, 99

### **Moderate (5)**

PS

1, 4, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21, 22, 23, 27, 29, 30, 32, 33, 38,  
39, 40, 42, 43, 44, 46, 48, 49, 50

DS

51, 53, 54, 56, 58, 61, 63, 70, 75, 78, 79, 80, 86, 87, 90, 97, 100

3. *PROBLEM SOLVING*

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### 3 Problem Solving

Note: this guide contains both an answer key (so you can quickly check your answers) and full explanations.

1. If  $6 - \frac{3}{m} = 4 + \frac{2}{n}$  and  $m = \frac{1}{2}$ , then  $n =$ 
  - (A)  $-8$
  - (B)  $-2$
  - (C)  $-\frac{1}{2}$
  - (D)  $\frac{1}{2}$
  - (E)  $2$
2. If  $x = -\frac{1}{3}$ , then  $1 - x - x^2 - x^3 =$ 
  - (A)  $\frac{1}{3}$
  - (B)  $\frac{13}{27}$
  - (C)  $\frac{14}{27}$
  - (D)  $1\frac{7}{27}$
  - (E)  $1\frac{1}{3}$
3. For a certain year, a charitable organization has set a fundraising goal of \$72,000, divided into 12 equal monthly allocations. If the organization raised \$20,000 in the first three months, by how much has it exceeded its goal for the first three months?
  - (A) \$200
  - (B) \$400
  - (C) \$600
  - (D) \$1,100
  - (E) \$2,000
4. If  $y^2 = 3z^3$  and  $2z = 4$ , what is the value of  $y^2 + z$  ?
  - (A)  $2\sqrt{7}$
  - (B)  $2(\sqrt{6} + 1)$
  - (C) 26
  - (D) 28
  - (E) 32

3. *PROBLEM SOLVING*

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5. A shipment contains  $b$  boxes. Each box contains  $p$  packages. If each package contains 12 snack cakes, how many snack cakes are contained in 2 shipments?
- (A)  $12bp$   
(B)  $\frac{12p}{b}$   
(C)  $24bp$   
(D)  $\frac{24p}{b}$   
(E)  $\frac{24}{pb}$
6. Which of the following CANNOT be a value of  $\frac{2}{x-2}$  ?
- (A)  $-1$   
(B)  $0$   
(C)  $\frac{1}{3}$   
(D)  $1$   
(E)  $2$
7. Running at the same constant rate, 3 identical machines can produce a total of  $x$  rods per minute. At this rate, how many rods could 8 such machines produce in 5 minutes?
- (A)  $\frac{40x}{3}$   
(B)  $\frac{24x}{5}$   
(C)  $\frac{15x}{8}$   
(D)  $\frac{8x}{15}$   
(E)  $\frac{3x}{40}$
8. Combined, Dylan and Bailey weigh 200 pounds. If 100 pounds more than Dylan's weight is three times Bailey's weight, what is Dylan's weight?
- (A) 50  
(B) 75  
(C) 100  
(D) 125  
(E) 150
9. Kaden's salary last year was \$125,000. If his salary is cut between  $x\%$  and  $y\%$ , then his new annual salary will be between
- (A)  $\$125,000(1-x)$  and  $\$125,000(1-y)$   
(B)  $\$125,000x$  and  $\$125,000y$   
(C)  $\$125,000 - x$  and  $\$125,000 - y$   
(D)  $\$1,250(1-x)$  and  $\$1,250(1-y)$   
(E)  $\$1,250(100-x)$  and  $\$1,250(100-y)$

3. *PROBLEM SOLVING*

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10. As  $x$  increases from 209 to 210, which of the following must increase?
- I.  $3x - 4$
  - II.  $1 - \frac{1}{x}$
  - III.  $x - x^2$
- (A) I only  
(B) III only  
(C) I and II  
(D) I and III  
(E) II and III
11. The average (arithmetic mean) of 5, 25, and 45 is 10 more than the average of 10, 30, and
- (A) 5  
(B) 15  
(C) 25  
(D) 35  
(E) 45
12. If  $2y + 3 = 0$  and  $4y + 5z = 9$ , what is the value of  $z$  ?
- (A)  $-3$   
(B)  $-\frac{5}{3}$   
(C)  $\frac{5}{3}$   
(D)  $\frac{7}{3}$   
(E)  $3$
13. In the formula  $V = \frac{1}{(2r)^2}$ , if  $r$  is halved, then  $V$  is multiplied by
- (A) 16  
(B) 4  
(C) 1  
(D)  $\frac{1}{4}$   
(E)  $\frac{1}{16}$
14.  $(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3}) =$
- (A)  $-\sqrt{6}$   
(B)  $-1$   
(C) 1  
(D)  $\sqrt{5}$   
(E) 5

3. *PROBLEM SOLVING*

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15. If  $j = 9$  and  $k = -9$ , what is the value of  $3j - 3k + jk$  ?
- (A) 135  
(B) 54  
(C) 27  
(D) -27  
(E) -54
16. Which of the following CANNOT be the median of the four positive integers  $a$ ,  $b$ ,  $c$ , and  $d$  ?
- (A)  $c$   
(B)  $d$   
(C)  $\frac{a+d}{2}$   
(D)  $\frac{a+b+c}{2}$   
(E)  $a + b + d$
17. If Marshall was 26 years old 7 years ago, how old was he  $y$  years ago?
- (A)  $y - 33$   
(B)  $y - 19$   
(C)  $33 - y$   
(D)  $19 - y$   
(E)  $19 + y$
18. If  $c > b$ ,  $a > d$ ,  $c > a$ , and  $b > d$ , which of the following must be true?
- I.  $c > d$   
II.  $b > a$   
III.  $a = b$
- (A) I only  
(B) II only  
(C) III only  
(D) I and II  
(E) I and III
19. If  $j$ ,  $k$ , and  $x$  are positive integers, and  $x \times 10^j < x \times 10^k$ , which of the following must be true?
- (A)  $x > x \times 10^k$   
(B)  $x > 1$   
(C)  $j > 1$   
(D)  $k > 2$   
(E)  $k > j$

3. *PROBLEM SOLVING*

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20. If  $(x - 2)(8 - \frac{4}{x}) = 0$  and  $x \neq 2$ , then  $x =$
- (A)  $-\frac{1}{2}$
  - (B)  $-\frac{1}{4}$
  - (C)  $\frac{1}{4}$
  - (D)  $\frac{1}{2}$
  - (E) 4
21. The average (arithmetic mean) of 6 numbers is 8.4. When one number is discarded, the average of the remaining numbers becomes exactly 1 less than the original average. What is the discarded number?
- (A) 6.0
  - (B) 9.4
  - (C) 11.4
  - (D) 12.0
  - (E) 13.4
22. Which of the following equations has a root in common with  $x^2 - x - 2 = 0$  ?
- (A)  $x^2 + x - 2 = 0$
  - (B)  $2x^2 - 32 = 0$
  - (C)  $x^2 + 3x - 4 = 0$
  - (D)  $x^2 + 3x - 10 = 0$
  - (E)  $x^2 - x - 6 = 0$
23. The census bureau predicts that the population of City X will increase no less than 5% and no more than 30% in the next five years. If the current population of City X is  $q$ , which of the following could be the population of City X in five years, if the census bureau's prediction is correct?
- (A)  $0.25q$
  - (B)  $0.75q$
  - (C)  $q$
  - (D)  $1.25q$
  - (E)  $1.5q$
24. The number  $2 - x$  is how many times the number  $1 - x$  ?
- (A)  $\frac{1}{2}$
  - (B) 1
  - (C) 2
  - (D)  $\frac{1-x}{2-x}$
  - (E)  $\frac{2-x}{1-x}$



3. *PROBLEM SOLVING*

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25. If  $x = -1$ , then  $(x^4 - x^3 - x^2 - x) =$   
 (A) 2  
 (B) 1  
 (C) 0  
 (D) -1  
 (E) -2
26. Which of the following CANNOT be a value of  $x$  when  
 $y = \frac{x}{x-1}$  ?  
 (A) -2  
 (B) -1  
 (C) 0  
 (D)  $\frac{1}{3}$   
 (E) 1
27.  $(\frac{1}{x})^2 - (\frac{1}{x})(\frac{1}{4}) =$   
 (A)  $\frac{4-x}{4x^2}$   
 (B)  $\frac{x-4}{4x^2}$   
 (C)  $\frac{4-x}{x^2-4x}$   
 (D)  $\frac{x-4}{x^2-4x}$   
 (E)  $\frac{1}{x^2-4x}$
28. Country X imported approximately \$1.44 billion of goods in 1996. If Country X imported \$288 million of goods in the first two months of 1997 and continued to import goods at the same rate for the rest of the year, by how much would Country X's 1997 imports exceed those of 1996?  
 (A) \$24 million  
 (B) \$120 million  
 (C) \$144 million  
 (D) \$240 million  
 (E) \$288 million
29. If it is true that  $x > -3$  and  $x < 6$ , which of the following must be true?  
 (A)  $x > 3$   
 (B)  $x > -6$   
 (C)  $x < 3$   
 (D)  $-6 < x < 3$   
 (E) None of the above

3. *PROBLEM SOLVING*

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30. The  $s$  subjects in an experiment are divided into 4 groups: 3 test groups and a control. If each group is further divided into units consisting of  $u$  subjects each, with each unit assigned to a different researcher, how many researchers are assigned to units?
- (A)  $\frac{s}{u}$   
(B)  $\frac{u}{s}$   
(C)  $\frac{3s}{u}$   
(D)  $\frac{4s}{u}$   
(E)  $\frac{4u}{s}$
31. Which of the following must be equal to zero for all real numbers  $x$  ?
- I.  $3x + (-3x)$   
II.  $x^2 - x^{-2}$   
III.  $-\frac{1}{x}$
- (A) I only  
(B) III only  
(C) I and II only  
(D) I and III only  
(E) II and III only
32. If  $x^2 = \frac{1}{3}y^3$  and  $3y = 9$ , what is the value of  $x^2 + y$  ?
- (A) -12  
(B) -6  
(C) 6  
(D) 9  
(E) 12
33. Patrick purchased a set of six toy cars of different sizes at a total cost of \$16.50. Each toy car cost \$0.50 more than the next one below it in size. What was the cost, in dollars, of the largest toy car?
- (A) \$2.50  
(B) \$3.00  
(C) \$3.50  
(D) \$3.75  
(E) \$4.00

3. *PROBLEM SOLVING*

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34. In a recent election, Geoff received 0.5 percent of the 6,000 votes cast. To win the election, a candidate needed to receive more than  $x\%$  of the vote. If Geoff needed exactly 3,571 more votes to win the election, what is the value of  $x$  ?
- (A) 50  
(B) 54  
(C) 56  
(D) 60  
(E) 63
35. If  $3x + 2y = -1$  and  $4x + 8 = 0$ , what is the value of  $y$  ?
- (A)  $-\frac{7}{2}$   
(B)  $-\frac{5}{2}$   
(C) 1  
(D)  $\frac{5}{2}$   
(E)  $\frac{7}{2}$
36. If -4 is 8 more than  $x$ , what is the value of  $\frac{x}{4}$  ?
- (A) -12  
(B) -3  
(C) -1  
(D) 1  
(E) 3
37. In a certain concert series, an opening-night ticket costs \$20 less than twice as much as a ticket to any other concert. If the cost of one opening-night ticket and one other ticket is \$100, what is the cost of an opening-night ticket?
- (A) \$25  
(B) \$40  
(C) \$50  
(D) \$60  
(E) \$75
38. If  $a = 5$  and  $b = -5$ , what is the value of  $2a - 3b - b^2$  ?
- (A) -50  
(B) -40  
(C) 0  
(D) 20  
(E) 50

3. *PROBLEM SOLVING*

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39. If  $r$ ,  $s$ , and  $t$  are nonzero integers are  $\frac{r-s}{t} = 1$ , which of the following is true?
- (A)  $r = s - t$
  - (B)  $s = r - t$
  - (C)  $s = t - r$
  - (D)  $r = t - s$
  - (E)  $t = s - r$
40. If  $a + b = 5c$ , then which of the following represents the average (arithmetic mean) of  $a$ ,  $b$ , and  $c$ , in terms of  $c$ ?
- (A)  $\frac{c}{3}$
  - (B)  $c$
  - (C)  $\frac{3c}{2}$
  - (D)  $2c$
  - (E)  $3c$
41. If  $3x + 4y = -1$  and  $2x + 6 = 0$ , what is the value of  $y$ ?
- (A)  $-2\frac{1}{2}$
  - (B)  $-2$
  - (C)  $-\frac{1}{2}$
  - (D)  $2$
  - (E)  $2\frac{1}{2}$
42. If  $a = -1$  and  $b = 1$ , then  $a^3(x + y) + b^2(x - y) =$
- (A)  $2$
  - (B)  $2x$
  - (C)  $-2y$
  - (D)  $2(x - y)$
  - (E)  $-2(x + y)$
43. The formula  $F = \frac{9}{5}C + 32$  gives the relationship between the temperature in degrees Fahrenheit,  $F$ , and the temperature given in degrees Celsius,  $C$ . At what value of  $F$  and  $C$  does  $F = C$  ?
- (A)  $0$
  - (B)  $-20$
  - (C)  $-32$
  - (D)  $-40$
  - (E)  $-50$

3. *PROBLEM SOLVING*

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44. Which of the following must be equal to one for all real numbers  $x$  ?
- I.  $(x^3)^{\frac{1}{3}}$
  - II.  $x^3 - x^3$
  - III.  $\frac{x^3}{x^3}$
- (A) I only  
(B) III only  
(C) I and II only  
(D) I and III only  
(E) II and III only
45. If Emma was  $m$  years old 5 years ago, how old was she  $n$  years ago?
- (A)  $(m + 5) - n$   
(B)  $(n + 5) - m$   
(C)  $(m - 5) + n$   
(D)  $(n - 5) - m$   
(E)  $(n + m) + 5$
46. Which of the following equations has a root in common with  $x^4 - 16 = 0$  ?
- (A)  $x^2 + 3x - 4 = 0$   
(B)  $x^2 - 2 = 0$   
(C)  $x^2 + 5x + 4 = 0$   
(D)  $x^3 - 16 = 0$   
(E)  $x^2 - x - 2 = 0$
47. If  $x$  is 15 more than -25, what is the value of  $\frac{x}{5}$  ?
- (A) -5  
(B) -3  
(C) -2  
(D) 3  
(E) 5

3. *PROBLEM SOLVING*

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48. Rates for having documents reproduced at a certain copy center are \$0.10 per page for the first copy of a document and \$0.07 for each additional copy of a document. A client asks the copy center to reproduce 100 different one-page documents. If the client asks the copy center to make two copies of 30 of the documents, three copies of 20 of the documents, and one copy of the remaining documents, what was the total cost of reproducing the documents?
- (A) \$10.00  
(B) \$13.50  
(C) \$14.90  
(D) \$15.00  
(E) \$17.00
49. If  $d$  is the standard deviation of  $a$ ,  $b$ , and  $c$ , what is the standard deviation of  $a + 10$ ,  $b + 10$ , and  $c + 10$  ?
- (A)  $d$   
(B)  $2d$   
(C)  $10d$   
(D)  $d + \frac{10}{3}$   
(E)  $d + 10$
50. In a survey of market analysts, each analyst selected from a list of 20 mutual funds the 2 mutual funds that the analyst thought would have the greatest increase in price over the next 12 months. If each mutual fund were selected 5 times, how many analysts were surveyed?
- (A) 50  
(B) 60  
(C) 80  
(D) 100  
(E) 160

## 4 Data Sufficiency

For all Data Sufficiency questions, the answer choices are as follows:

- (A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- (B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- (C) BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- (D) EACH statement ALONE is sufficient.
- (E) Statements (1) and (2) TOGETHER are NOT sufficient.

51. Is  $xy > 5$  ?

- (1)  $x \leq 2$
- (2)  $y \geq 2$

52. If  $l$  and  $w$  represent the length and width, respectively, of a rectangle, what is the perimeter?

- (1)  $l + w = 22$
- (2)  $l - w = 8$

53. If  $z \neq 0$ , is  $y$  greater than zero?

- (1)  $yz = 6$
- (2)  $y + z = 7$

54. If  $x$ ,  $y$ , and  $z$  are three integers, are they consecutive integers?

- (1)  $x = 3y$
- (2)  $z = 2x$

55. What is the value of  $y$ ?

- (1)  $y + z = y - z$
- (2)  $y + z = 3$

56. If  $T$  is an integer between 10 and 100, what is the value of  $T$  ?

- (1) The positive difference between  $T$ 's digits is 4.
- (2) The sum of  $T$ 's digits is 12.

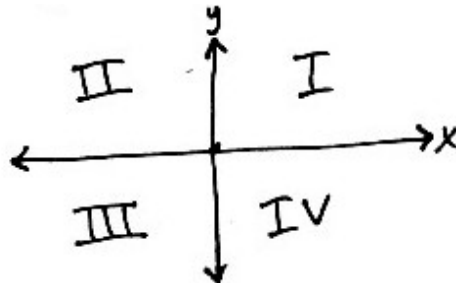
57. Is the value of  $n$  closer to 25 than to 50 ?

- (1)  $50 - n > n - 25$
- (2)  $n > 35$

4. DATA SUFFICIENCY

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58. Is  $xy < 8$ ?
- (1)  $\frac{1}{3} < x < \frac{1}{2}$  and  $y^2 < 225$
- (2)  $x < 4$  and  $y < 2$
59. What is the value of  $k - m$  ?
- (1)  $(k - m)^3 = 8$
- (2)  $(k - m)^5 = 32$



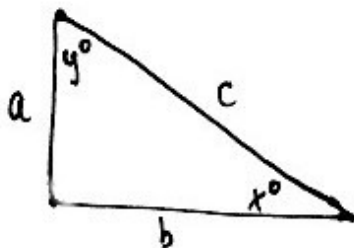
60. Point  $(x, y)$  lies in which quadrant of the rectangular coordinate system shown above?
- (1)  $xy > 0$
- (2)  $x + y < 0$
61. If  $a$ ,  $b$ , and  $c$  are positive numbers, is  $a < b < c$  ?
- (1)  $ab = bc$
- (2)  $ac = bc$
62. Is  $b = 3$ ?
- (1)  $b^4 = 81$
- (2)  $b^3 = 27$
63. If  $xy = -8$ , what is the value of  $xy(x + y)$  ?
- (1)  $xy^2 = 16$
- (2)  $x - y = 6$
64. What is the value of  $\frac{x}{2} + \frac{y}{2}$ ?
- (1)  $x + y = 9$
- (2)  $\frac{x+y}{3} = 3$



4. DATA SUFFICIENCY

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65. An electronics store that rents movies rents each of its VHS movies for a certain price and each of its DVD movies for a certain price. If Marvin, Pauline, and Sammy rented movies in this store, how much did Marvin pay to rent 2 VHS movies and 2 DVD movies?
- (1) Pauline rented 3 VHS movies and 4 DVD movies and paid \$7.25 more than Marvin.  
(2) Sammy rented 1 VHS movie and paid \$7.25 less than Marvin.
66. If  $x$  and  $y$  are positive, what is the value of  $y$  ?
- (1)  $x = 7.713$   
(2)  $x = 8.137y$
67. If  $2x + y + 1 = x - y$ , what is the value of  $x$ ?
- (1)  $y^2 = 4$   
(2)  $y = 2$
68. What is the value of  $x$  ?
- (1)  $\frac{1}{2x} = (\frac{1}{2})^4$   
(2)  $2(x + 1) = 3(x - 2)$
69. What is the value of the positive integer  $n$  ?
- (1)  $n = n^2$   
(2)  $n^4 < 25$



70. In the triangle above, does  $a^2 + b^2 = c^2$ ?
- (1)  $x = y$   
(2) The ratio of  $a$  to  $c$  is  $2 : 2\sqrt{2}$ .
71. If  $x$  and  $y$  are integers, what is the value of  $y$  ?
- (1)  $y = x^2$   
(2)  $xy = 8$

4. DATA SUFFICIENCY

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72. How many television sets did a certain electronics store sell on Tuesday?
- (1) The number of television sets sold on Tuesday was 5 fewer than twice the number sold on Monday.
  - (2) The number of television sets sold on Monday was 4 fewer than the number sold on Tuesday.
73. What is Thomas's age now?
- (1) Thomas's sister Willa is now twice as old as Thomas was exactly 6 years ago.
  - (2) Thomas's age is now 50% greater than his age exactly 6 years ago.
74. If  $w + x = 18$ , what is the value of  $wx$  ?
- (1)  $w$  and  $x$  are consecutive even integers.
  - (2)  $w$  and  $x$  are positive integers.
75. What is the value of  $a + b$  ?
- (1)  $(a + b)^2 = 4$
  - (2)  $a = 2 - b$
76. Is  $x < y$  ?
- (1)  $z > x$
  - (2)  $z > y$
77. Is  $x < 0$  ?
- (1)  $x^3 < 0$
  - (2)  $-3x > 0$
78. What is the value of  $x^2 - y^2$  ?
- (1)  $x + y = \frac{1}{x-y}$
  - (2)  $x + y = 3 - y$
79. Is  $x > y$  ?
- (1)  $\frac{y}{2} = x - 1$
  - (2)  $x$  is negative.
80. What is the ratio of  $x : y : z$ ?
- (1)  $x$  is three times  $y$  and one-third  $z$ .
  - (2)  $z$  is three times  $x$  and nine times  $y$ .

4. DATA SUFFICIENCY

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81. What is the value of  $b - c$  ?  
(1)  $b = c + 5$   
(2)  $(b - c)^2 = 25$
82. If  $xy < 4$ , is  $x < 1$  ?  
(1)  $y > 4$   
(2)  $x < 4$
83. If  $\frac{p}{q} = \frac{5}{4}$ , what is the value of  $p + q$  ?  
(1)  $2p + q = 28$   
(2)  $p > 0$
84. The perimeter of a rectangular lot is 160 feet. What is the length of the lot?  
(1) The length of the lot is three times the width.  
(2) The area of the lot is 1200 square feet.
85. If  $5x(2n) = t$ , what is the value of  $t$  ?  
(1)  $5x = 30$   
(2)  $x = n + 4$
86. If  $x$ ,  $y$ , and  $z$  are numbers, is  $z = 16$  ?  
(1)  $x + y = 8$   
(2) The average (arithmetic mean) of  $x$ ,  $y$ , and  $z$  is 8.
87. A drawer contains 32 buttons, of which 20 are blue and 12 are brown. If 7 of the buttons are removed, how many of the buttons left in the drawer are brown?  
(1) The difference between the number of blue buttons removed and the number of brown buttons removed is 1.  
(2) Each of the first 4 buttons removed are brown.
88. If  $-15 < j < 15$ , is  $j > 0$  ?  
(1)  $j^3 > 0$   
(2)  $j^2 > 0$
89. What is the value of  $a$  ?  
(1)  $a^2 = 2a - 1$   
(2)  $a^2 = 1$
90. If  $xy > 0$ , does  $(x - 1)(y - 1) = 1$ ?  
(1)  $xy = 1$   
(2)  $x + y = 1$

4. DATA SUFFICIENCY

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91. The only contents of a shopping bag are 20 large buttons and 32 small buttons. What is the total weight, in ounces, of the bag's contents?
- (1) Each small button weighs  $\frac{4}{9}$  as much as each large button.
  - (2) The total weight of 4 large buttons is 9 times the weight of 1 small button.
92. If  $x + y + z > 0$ , is  $z > 1$  ?
- (1)  $x < 0$
  - (2)  $y < 0$
93. If  $x$  and  $y$  are positive, what is the value of  $x$  ?
- (1)  $x$  is the square of  $y$ .
  - (2)  $y$  is the square of  $\frac{x}{8}$ .
94. If Carla, Nora, and Wanda have a total of \$48, how much money does Carla have?
- (1) The positive difference between the amounts of money that Carla and Nora have is \$12.
  - (2) Nora and Wanda have the same amount of money.
95. Is  $z$  less than 0 ?
- (1)  $\frac{x}{y} < 0$  and  $\frac{y}{z} > 0$ .
  - (2)  $x < 0$
96. What is the value of  $r + s$  ?
- (1)  $\frac{r-s}{2} = 5$
  - (2)  $\frac{r}{2} - \frac{s}{2} = 5$
97. In the fraction  $\frac{x}{y}$ , where  $x$  and  $y$  are positive integers, what is the value of  $y$  ?
- (1) The least common denominator of  $\frac{x}{y}$  and  $\frac{1}{2}$  is 6.
  - (2)  $x = 1$
98. If  $q + k = p$ , what is the value of  $k$  ?
- (1)  $q = 8$
  - (2)  $2p + 8 = 2q$
99. What number is 30 percent of  $x$  ?
- (1) 220 is 10 percent greater than twice  $x^2$ .
  - (2)  $\frac{3}{5}$  of half  $x^2$  is 30.
100. Is  $x$  a negative number?
- (1)  $5x > 10x$
  - (2)  $x + 5$  is positive.

## 5 Answer Key

For full explanations, see the next section.

1. C
2. D
3. E
4. C
5. C
6. B
7. A
8. D
9. E
10. C
11. A
12. E
13. B
14. B
15. D
16. E
17. C
18. A
19. E
20. D
21. E
22. D
23. D
24. E
25. A
26. E
27. A
28. E
29. B
30. A
31. A
32. E
33. E
34. D
35. D
36. B
37. D
38. C
39. B
40. D
41. D

5. ANSWER KEY

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- 42. C
- 43. D
- 44. B
- 45. A
- 46. E
- 47. C
- 48. C
- 49. A
- 50. A
- 51. E
- 52. A
- 53. C
- 54. C
- 55. C
- 56. E
- 57. A
- 58. A
- 59. D
- 60. C
- 61. D
- 62. B
- 63. A
- 64. D
- 65. E
- 66. C
- 67. B
- 68. D
- 69. A
- 70. C
- 71. C
- 72. C
- 73. B
- 74. A
- 75. B
- 76. E
- 77. D
- 78. A
- 79. C
- 80. D
- 81. A
- 82. A
- 83. A
- 84. A
- 85. C
- 86. C
- 87. C

5. *ANSWER KEY*

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- 88. A
- 89. A
- 90. C
- 91. E
- 92. E
- 93. C
- 94. E
- 95. C
- 96. E
- 97. E
- 98. B
- 99. E
- 100. A

## 6 Explanations

For a quick-reference answer key, see the previous section.

1. C

Explanation: If  $m = \frac{1}{2}$ , the left side of the equation simplifies as follows:  
 $6 - \frac{3}{m} = 6 - \frac{3}{\frac{1}{2}} = 6 - 6 = 0$ .

Thus, the right side of the equation is equal to zero:

$$4 + \frac{2}{n} = 0$$

$$\frac{2}{n} = -4$$

$$2 = -4n$$

$$n = -\frac{2}{4} = -\frac{1}{2}, \text{ choice (C).}$$

2. D

Explanation: If  $x = -\frac{1}{3}$ , then  $1 - x - x^2 - x^2 = 1 - (-\frac{1}{3}) - (\frac{1}{9}) - (-\frac{1}{27}) = \frac{27}{27} + \frac{9}{27} - \frac{3}{27} + \frac{1}{27} = \frac{34}{27} = 1\frac{7}{27}$ .

3. E

Explanation: We're given the amount the organization has raised in the first three months. To find the amount by which that exceeds its goals for that time, we need to know the goal for the 3 months. The goal for the year is equally divided, for a total of \$72,000. 3 months is  $\frac{1}{4}$  of a year, so the goal for 3 months is  $\frac{1}{4}(72,000) = 18,000$ . The organization, then, has exceeded its goal by  $\$20,000 - \$18,000 = \$2,000$ , choice (E).

4. C

Explanation: The second equation allows you to solve for  $z$ :  $z = \frac{4}{2} = 2$ . With the value of  $z$ , you can solve for  $y^2$ :

$$y^2 = 3z^3 = 3(2^3) = 3(8) = 24$$

Put it together:

$$y^2 + z = 24 + 2 = 26, \text{ choice (C).}$$

5. C

Explanation: Start from the smaller segments and work your way up to the size of 2 shipments. The number of snack cakes in one package is 12. Thus, if each box has  $p$  packages, the number of snack cakes in a box is  $12p$ . A shipment contains  $b$  boxes, and there are  $12p$  cakes per box, so the number of snack cakes per shipment is  $12bp$ . Since we're looking for the number in two shipments, double that:  $24bp$ , choice (C).

6. B

Explanation: The expression could be equal to any value except for 0. For instance, if you set  $\frac{2}{x-2} = 2$ , solve for  $x$ :

$$2 = 2(x - 2)$$

$$2 = 2x - 4$$



6. EXPLANATIONS

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$$2x = 6$$

$$x = 3$$

However, there's no way for the expression to be equal to zero. The only way a fraction will be equal to zero is if the numerator is 0, which it isn't. Choice (B) is correct.

7. A

Explanation: If 3 machines can produce  $x$  rods per minute, they can produce  $5x$  rods in 5 minutes. That's a rate of  $\frac{5x}{3}$  per machine over that five-minute period. Since we want to know how many rods 8 machines could produce, multiply that by 8:

$$8\left(\frac{5x}{3}\right) = \frac{40x}{3}, \text{ choice (A).}$$

8. D

Explanation: The question gives you two equations:

$$d + b = 200$$

$$d + 100 = 3b$$

To solve, just subtract the second equation from the first, and simplify:

$$b - 100 = 200 - 3b$$

$$4b = 300$$

$$b = 75$$

We're looking for Dylan's weight, so plug  $b$  back into the first equation;

$$d + 75 = 200$$

$$d = 125, \text{ choice (D).}$$

9. E

Explanation: Consider what happens when the salary is cut by  $x\%$ .  $x\%$  is the same as  $\frac{x}{100}$ . If, for example, a salary is reduced by 30%, you can find the new salary by multiplying by one minus the reduction. Using 30%:

$$\$125,000\left(1 - \frac{30}{100}\right) = 125,000(.7)$$

To abstract that out for this question, the salary, after being reduced by  $x\%$ , is:

$$\$125,000\left(1 - \frac{x}{100}\right)$$

There aren't any choices with fractions like that, so try multiplying out the parentheses:

$$\$125,000 - \frac{125,000x}{100} = 125,000 - 1,250x = 1,250(100 - x)$$

The procedure for  $y\%$  would be exactly the same: you don't need to do it, just recognize that the two terms in the correct answer will be the same, except for the name of the variable. (E) is the correct choice.

10. C

Explanation: As  $x$  increases from 209 to 210 (or from any positive integer to the next positive integer),  $3x$  will get bigger. Thus, since  $3x - 4$  is always 4 less than  $3x$ , it will increase as well. Eliminate (B) and (E).

With II, you can disregard the 1, just as you could ignore the -4 in I. As  $x$  increases,  $\frac{1}{x}$  decreases, since the denominator gets bigger. However, II includes

6. EXPLANATIONS

$-\frac{1}{x}$ , which moves in the opposite direction, because it is negative. So, II increases as well. The only remaining answer is (C), I and II.

For the sake of completeness, let's look at III. The bigger the value of  $x$ , the bigger the value of  $x^2$ . With each addition of 1 (as in 209 to 210),  $x$  increases by 1, but  $x^2$  increases by more. (In the case of 210, much more.) So, as  $x$  increases,  $x^2$  increases more, which means that  $-x^2$  decreases more. Because  $-x^2$  decreases more than  $x$  increases,  $x - x^2$  decreases as  $x$  increases.

11. A

Explanation: The average of 5, 25, and 45 is:

$$\frac{5+25+45}{3} = \frac{75}{3} = 25$$

(Since the numbers are evenly spaced, you don't need to do the calculation: the mean is the same as the median.)

25 is 10 more than 15, so 15 is the average of 10, 30, and our answer:

$$15 = \frac{10+30+x}{3}$$

$$45 = 40 + x$$

$$x = 5, \text{ choice (A).}$$

12. E

Explanation: The first equation allows you to solve for  $y$ :

$$2y + 3 = 0$$

$$2y = -3$$

$$y = -\frac{3}{2}$$

Plug in the value of  $y$  to the second equation to solve for  $z$ :

$$4(-\frac{3}{2}) + 5z = 9$$

$$-6 + 5z = 9$$

$$5z = 15$$

$$z = 3, \text{ choice (E).}$$

13. B

Explanation: Another way of writing the equation in the question is to distribute the exponent on the right side:

$$V = \frac{1}{4r^2}$$

If  $r$  is halved, replace  $r$  with  $\frac{r}{2}$  in the initial equation:

$$V = \frac{1}{(2(\frac{r}{2}))^2} = \frac{1}{r^2}$$

The denominator is one-fourth of what it was before. If the denominator is multiplied by  $\frac{1}{4}$ , the entire expression is multiplied by 4, choice (B).

14. B

Explanation: It's useful that you recognize this as the difference of squares, the same format as  $(x+y)(x-y) = x^2 - y^2$ . You can find the answer by using the FOIL method, but it will take much longer.

Recognizing this as the difference of squares, where  $x = \sqrt{2}$  and  $y = \sqrt{3}$ , the answer is

$$x^2 - y^2 = (\sqrt{2})^2 - (\sqrt{3})^2 = 2 - 3 = -1, \text{ choice (B).}$$

6. EXPLANATIONS

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15. D

Explanation: Plug in the given values for  $j$  and  $k$ :

$$3j - 3k + jk$$

$$3(9) - 3(-9) + 9(-9)$$

$$27 + 27 - 81 = -27, \text{ choice (D).}$$

16. E

Explanation: The median must be the average of the two middle numbers. We don't know the order of the four variables, so it's possible that it is, for instance,  $d$ : if  $a = 1$ ,  $b = 2$ ,  $c = 3$ , and  $d = 2$ ,  $b$  and  $d$  are both the median.

The answer is (E):  $a + b + d$  is greater than all three of those integers. The median must be less than or equal to two of the integers, so it can't be greater than three of them.

17. C

Explanation: If Marshall was 26 years old 7 years ago, Marshall is currently 33 ( $26 + 7$ ) years old.  $y$  years ago, Marshall was  $y$  years younger than he is now, so his age  $y$  years ago is expressed with choice (C),  $33 - y$ .

18. A

Explanation: The information needs to be sorted, first. We can link the inequalities as follows:  $c > b > d$ , and  $c > a > d$ . Nothing is known about the relationship between  $a$  and  $b$ . I must be true, as shown in the inequality  $c > b > d$ , so eliminate (B) and (C). As the relationship between  $a$  and  $b$  is not given, neither II nor III must be true. Thus the correct answer is (A).

19. E

Explanation: Start by simplifying the inequality. Since  $x$  is positive, we can divide both sides by  $x$ , leaving us with:

$$10^j < 10^k$$

The only way this is true is if  $k$  is larger than  $j$ , choice (E).

20. D

Explanation: One of the two terms must equal 0 for the product of the two to equal zero, and as  $x \neq 2$ , the first term cannot. Thus,  $8 - \frac{4}{x}$  must equal 0. To solve:

$$8 - \frac{4}{x} = 0$$

$$\frac{4}{x} = 8$$

$$4 = 8x$$

$$x = \frac{4}{8} = \frac{1}{2}, \text{ choice (D).}$$

21. E

Explanation: If the average of 6 numbers is 8.4, the sum of those numbers is 50.4. When one number is discarded, the new average is  $8.4 - 1 = 7.4$ , and there are 5 numbers in the set, which means the sum of the 5 remaining numbers

6. EXPLANATIONS

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if  $5(7.4) = 37$ . The difference between the sums tells us the number that was discarded:  $50.4 - 37 = 13.4$ , choice (E).

22. D

Explanation: First, find the roots of the equation in the question stem. It factors to  $(x - 2)(x + 1)$ , so the roots are  $x = 2$ ,  $x = -1$ . Unfortunately, to find the correct answer, you may have to go through all five:

(A) factors to  $(x - 1)(x + 2)$ .

(B) factors to  $2(x + 4)(x - 4)$ .

(C) factors to  $(x - 1)(x + 4)$ .

(D) factors to  $(x - 2)(x + 5)$ , so there's a match, (D)'s the correct answer.

(E) factors to  $(x + 2)(x - 3)$ , so no match.

23. D

Explanation: When an amount is increased by 5%, it is multiplied by 1.05. If the population,  $q$ , is increased by 5%, the new population will be  $1.05q$ . By the same reasoning, if the population increases by 30%, the new population will be  $1.3q$ . The only choice between those two endpoints is  $1.25q$ , choice (D).

24. E

Explanation: Call the variable we're looking for  $n$ . To translate the question:

$$2 - x = n(1 - x)$$

Solve for  $n$ :

$$n = \frac{2-x}{1-x}, \text{ choice (E).}$$

25. A

Explanation: If  $x = -1$ ,  $(x^4 - x^3 - x^2 - x) = (1 - (-1) - (1) - (-1)) = 1 + 1 - 1 + 1 = 2$ , choice (A).

26. E

Explanation: Whenever you're asked what can't be value of an expression or equation, look for denominators that could equal zero. In this case, the denominator  $x - 1$  cannot equal zero (if it did, the fraction would be undefined). If  $x - 1 = 0$ , then  $x = 1$ , choice (E).

27. A

Explanation:  $(\frac{1}{x})^2 = \frac{1}{x^2}$ , and  $(\frac{1}{x})(\frac{1}{4}) = \frac{1}{4x}$ . To get a common denominator, multiply  $\frac{1}{x^2}$  by  $\frac{4}{4}$  to get  $\frac{4}{4x^2}$ , and multiply  $\frac{1}{4x}$  by  $\frac{x}{x}$  to get  $\frac{x}{4x^2}$ . Then subtract  $\frac{x}{4x^2}$  from  $\frac{4}{4x^2}$  to get  $\frac{4-x}{4x^2}$ , choice (A).

28. E

Explanation: The \$288 million over two months represents  $\frac{1}{6}$  of a full year. If the imports continue at the same rate, the total imports for the year will be \$288 million times 6, or \$1.728 billion. The difference between that sum

6. EXPLANATIONS

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and Country X's \$1.44 billion of imports is \$1.728 - \$1.44 billion = \$288 million, choice (E).

29. B

Explanation: The correct answer must allow for all of the possible values of  $x$  between -3 and 6.

(A) doesn't do that: if  $x$  is greater than 3, it couldn't be between -3 and 3.

(B) does that: while it includes values between -6 and -3, it includes all of the values listed in the question, so it is correct.

(C) doesn't do that: if  $x$  is less than 3, it couldn't be between 3 and 6.

(D) doesn't do that: like (C), it limits  $x$  to no greater than 3.

(E) can be eliminated, since (B) is correct.

30. A

Explanation: The wording of this question is tricky: since there is one researcher per unit, we can look for the number of units. The number of subjects per unit is equal to the number of subjects divided by the number of units. We're looking for the number units. Since  $u$  is already used, let's call that  $n$ :

$$u = \frac{s}{n}$$

$$nu = s$$

$$n = \frac{s}{u}, \text{ choice (A).}$$

31. A

Explanation: I is equal to zero:  $3x + (-3x) = 0x = 0$

II is not always equal to zero. For instance, if  $x = 2$ ,  $x^2 - x^{-2} = 2^2 - 2^{-2} = 4 - \frac{1}{4} = 3\frac{3}{4}$ .

III is not always equal to zero. For instance, if  $x = 3$ ,  $-\frac{1}{x} = -\frac{1}{3}$ .

(A) must be correct.

32. E

Explanation: The second equation gives you the value of  $y$ :  $y = \frac{9}{3} = 3$ . With the value of  $y$ , you can use the first equation to solve for  $x^2$  (since the question asks for  $x^2 + y$ , you don't need  $x$ , specifically).

$$x^2 = \frac{1}{3}y^3 = \frac{1}{3}(3)^2 = \frac{1}{3}(27) = 9$$

Thus,  $x^2 + y = 9 + 3 = 12$ , choice (E).

33. E

Explanation: If the largest car cost  $x$  dollars, the next smallest cost  $x - 0.5$ , the next smallest cost  $x - 2(0.5)$ , and so on. The sum of those six cars can be expressed as follows:

$$x + (x - 0.5) + (x - 1) + (x - 1.5) + (x - 2) + (x - 2.5) = 16.50$$

$$6x - 7.5 = 16.5$$

$$6x = 24$$

$x = 4$ , choice (E).

6. EXPLANATIONS

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34. D

Explanation: To find the value of  $x$ , you need to determine the number of votes that a candidate must receive. Geoff received 0.5 percent of 6,000 votes:

$$0.005(6,000) = 5(6) = 30$$

If he received 3,571 more votes, that's a total of 3,601 votes. That's one more than 3,600, which is  $\frac{3,600}{6,000} = 60\%$  of the total votes cast. (D) is the correct choice.

35. D

Explanation: The second equation allows you to solve for  $x$ :

$$4x + 8 = 0$$

$$4x = -8$$

$$x = \frac{-8}{4} = -2$$

To solve for  $y$ , plug  $x = -2$  into the first equation:

$$3(-2) + 2y = -1$$

$$-6 + 2y = -1$$

$$2y = 5$$

$$y = \frac{5}{2}, \text{ choice (D).}$$

36. B

Explanation: If -4 is 8 more than  $x$ :

$$-4 = x + 8$$

$$x = -12$$

The value of  $\frac{x}{4} = \frac{-12}{4} = -3$ , choice (B).

37. D

Explanation: The question gives you two equations, each containing variables for the price of an opening night ticket (call that  $p$ ) and another ticket (call it  $q$ ). Those equations are:

$$p = 2q - 20$$

$$p + q = 100$$

Subtract the second equation from the first, and simplify:

$$-q = 2q - 120$$

$$120 = 3q$$

$$q = 40$$

That's the price of any other ticket, so plug that back into the second equation to find the price of an opening-night ticket:

$$p + 40 = 100$$

$$p = 60, \text{ choice (D).}$$

38. C

Explanation: Plug in the given values for  $a$  and  $b$ :

$$2a - 3b - b^2$$

$$2(5) - 3(-5) - (-5)^2$$

$$10 + 15 - 25 = 0, \text{ choice (C).}$$

6. EXPLANATIONS

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39. B

Explanation: Since none of the answer choices have fractions in them, start by rewriting the given equation to eliminate the fraction. Multiply both sides by  $t$ , resulting in:

$$r - s = t$$

That's not among the choices, so try adding  $s$  to both sides:

$$r = t + s$$

Still no luck. We've seen the equation solved for  $t$  and  $r$ ; try isolating  $s$ :

$$s = r - t$$

Finally a match: that's choice (B).

40. D

Explanation: The average of  $a$ ,  $b$ , and  $c$  is given by:

$$\frac{a+b+c}{3}$$

Since  $a + b = 5c$ , we can substitute that into the expression:

$$\frac{5c+c}{3} = \frac{6c}{3} = 2c, \text{ choice (D).}$$

41. D

Explanation: Use the second equation to solve for  $x$ :

$$2x + 6 = 0$$

$$2x = -6$$

$$x = -3$$

Plug in the value of  $x$  to solve the first equation for  $y$ :

$$3(-3) + 4y = -1$$

$$-9 + 4y = -1$$

$$4y = 8$$

$$y = 2, \text{ choice (D).}$$

42. C

Explanation: To start simplifying, plug in the given values for  $a$  and  $b$ :

$$(-1)^3(x + y) + (1)^2(x - y)$$

$$-1(x + y) + 1(x - y)$$

$$-x - y + x - y = -2y, \text{ choice (C).}$$

43. D

Explanation: The question gives you two equations: one for the conversion from  $F$  to  $C$ , and the other telling us the specific value of  $F$  we're looking for,  $F = C$ . To solve, plug the second into the first, replacing  $C$  with  $F$  (or vice versa, it doesn't matter):

$$F = \frac{9}{5}C + 32$$

$$F = \frac{9}{5}F + 32$$

$$32 = F - \frac{9}{5}F$$

$$32 = -\frac{4}{5}F$$

$$F = 32\left(-\frac{5}{4}\right) = -40, \text{ choice (D).}$$

44. B

6. EXPLANATIONS

Explanation: Simplify each of the roman numerals:

I.  $(x^3)^{\frac{1}{3}} = x^{3(\frac{1}{3})} = x^1 = x$

Unless  $x = 1$ , it doesn't simplify to 1.

II.  $x^3 - x^3 = 0$

III.  $\frac{x^3}{x^3} = x^{3-3} = x^0 = 1$

III is the only one of three that simplifies to 1, so (B) is the correct choice.

45. A

Explanation: If Emma was  $m$  years old 5 years ago, her age is now  $m + 5$ .  $n$  years ago, she was  $n$  years younger than she is now, so subtract  $n$  from her current age,  $m + 5$ :

$(m + 5) - n$ , choice (A).

46. E

Explanation: First, find the roots of the equation in the question stem.  $x^4 = 16$ , so  $x = 2$  or  $x = -2$ . To find the answer, go through all five choices, looking for one with a matching root:

(A) factors to  $(x - 4)(x + 1)$ , so it doesn't have a root in common.

(B) also has no whole number roots, so eliminate it.

(C) factors to  $(x + 4)(x + 1)$ , so it doesn't have a root in common, eliminate it.

(D) has no whole number roots, eliminate it.

(E) factors to  $(x - 1)(x + 2)$ , so it shares a root – that's the answer.

47. C

Explanation: If  $x$  is 15 more than -25:

$x = -25 + 15 = -10$

The value of  $\frac{x}{5} = \frac{-10}{5} = -2$ , choice (C).

48. C

Explanation: If the client asks that two copies are made of 30 of the 100 documents, and that three copies are made of 20 of the documents, that leaves 50 documents of one copy each. The prices are different for the first copy of each document and each successive copy, so we need to separate those numbers.

Since there is at least one copy made of each of the 100 one-page documents, there are 100 pages of "first copies," one for each document. For the 30 that have two copies made, that's 30 additional copies; and for the 20 that have three copies made, that's 40 additional copies—two additional copies per document. So, we have 100 "first copies" and 70 additional copies.

The cost per first copy page is \$0.10, so the total cost is:

$100(0.1) = 10$

The cost per additional copy page is \$0.07, so the total cost is:

$70(0.07) = 4.9$

The total cost, then, is \$14.90, choice (C).

49. A



6. EXPLANATIONS

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Explanation: The standard deviation of a set of numbers is determined by how the numbers are spaced apart from each other. While we don't know where  $a$ ,  $b$ , and  $c$  are on the number relative to each other, we do know their standard deviation,  $d$ . The three new numbers,  $a + 10$ ,  $b + 10$ , and  $c + 10$ , regardless of the values of the three variables, are spaced apart exactly the same way as  $a$ ,  $b$ , and  $c$  and thus have the same standard deviation as the original set. Since the standard deviation is the same, the answer we're looking for is  $d$ , choice (A).

50. A

Explanation: If each mutual fund were selected 5 times, and there are 20 mutual funds, that's a total of 100 selections. Since each analyst chose 2 mutual funds, the number of analysts surveyed is given by  $a$ :

$$2a = 100$$

So  $a = 50$ , choice (A).

51. E

Explanation: Statement (1) is insufficient: we don't know anything about  $y$ . If, for instance,  $x = 2$ ,  $xy$  could be less than or greater than 5 depending on the value of  $y$ . Statement (2) is also insufficient for the same reason: we only have information about one of the two variables.

Taken together, the statements are still insufficient.  $xy$  could be greater than 5: for instance, if  $x = 1$  and  $y = 6$ . However,  $xy$  could be less than 5, if  $x = 2$  and  $y = 2$ . Choice (E) is correct.

52. A

Explanation: Statement (1) is sufficient. The equation for perimeter of a rectangle is  $p = 2l + 2w$ , or  $p = 2(l + w)$ . (1) gives us  $l + w$ , so if you double 22, you have the perimeter.

Statement (2) is insufficient: there's no way to translate that equation into the perimeter equation, and there's no way to solve for each of the variables without another equation. Choice (A) is correct.

53. C

Explanation: Statement (1) is insufficient:  $y$  and  $z$  have the same sign, so  $y$ 's sign depends on that of  $z$ , which we know nothing about.

Statement (2) is also insufficient. If  $z$  is greater than 7,  $y$  must be less than zero, but if  $z$  is less than 7,  $y$  must be greater than zero.

Taken together, the statements are sufficient. In (2), the only way that  $y$  is negative is if  $z$  is positive (and greater than 7). However, given the limitations of (1), if  $z$  is positive,  $y$  must be positive. In other words, it's impossible for  $y$  to be negative; thus,  $y$  must be positive. Choice (C) is correct.

54. C

Explanation: Statement (1) is insufficient: if  $x = 3$  and  $y = 1$ , it's possible that the integers are consecutive. (That in itself allows for a "yes"

6. EXPLANATIONS

---

answer if  $z = 2$  and a "no" answer for any other value of  $z$ .) If  $x$  and  $y$  are any other set of acceptable values, the answer is "no."

Statement (2) is similarly insufficient. If  $x = 1$  and  $z = 2$ , it's possible that the integers are consecutive, depending on the value of  $y$ . For any other values of  $x$  and  $z$ , though, the answer is "no."

Taken together, the statements are sufficient. If you divide the equation in (1) by 3, the result is  $\frac{x}{3} = y$ , which allows you consider all three variables in terms of  $x$ . The variables, then, are  $\frac{x}{3}$ ,  $x$ , and  $2x$ . Since  $x$  (as well as the other variables) must be integers, there is no way that  $\frac{x}{3}$  and  $x$  will be consecutive, since  $x$  is three times greater than  $\frac{x}{3}$ . Since  $2x$  is larger than either one, that means the integers can't be consecutive. Choice (C) is correct.

55. C

Explanation: Statement (1) is insufficient, but it can be simplified. Subtract  $y$  from both sides, and the result is:

$$z = -z$$

$$z = 0$$

Statement (2) is also insufficient: in order to find the value of  $y$ , you first need to know the value of  $z$ .

Taken together, the statements are sufficient. If  $z = 0$ , then we can solve the equation in (2):

$$y + 0 = 3$$

$$y = 3, \text{ and choice (C) is correct.}$$

56. E

Explanation: Statement (1) is insufficient. If we call  $T$ 's digits  $a$  and  $b$ , either  $a - b = 4$  or  $b - a = 4$ . Even if we knew which of the two equations was correct, we wouldn't know the value of each digit.  $T$  could be any number of integers, including 15, 73, and 59, just to name three.

Statement (2) is also insufficient. Using the same variable names,  $a + b = 12$ . That also gives us a variety of options, such as 66, 75, and 84.

Taken together, it may appear that the statements are sufficient, but they are not. The only possible pair of digits that are four apart and sum to 12 is 8 and 4, but we don't know whether  $T$  is 48 or 84. Choice (E) is correct.

57. A

Explanation: Statement (1) is sufficient. Start by simplifying the inequality:

$$50 > 2n - 25$$

$$75 > 2n$$

$$37.5 > n$$

37.5 is the midpoint between 25 and 50, so if  $n$  is less than that, it is closer to 25 than to 50.

Statement (2) is insufficient: if 37.5 is the midpoint and  $n$  is greater than 35,  $n$  could be less than or greater than the midpoint between 25 and 50. Choice (A) is correct.

6. EXPLANATIONS

---

58. A

Explanation: Statement (1) is sufficient. If  $y^2 < 225$ , then  $y$  is between -15 and 15. If  $y$  is negative, then  $xy$  must be negative (which must be less than 8). To see whether it's possible that  $xy$  could be greater than 8, take the largest possible values of  $x$  and  $y$ :  $\frac{1}{2}$  and 15, respectively. (Since they are determined by inequalities, the variables couldn't be those exact numbers, but they could be so infinitesimally close that we might as well use the round numbers.) If those are the values,  $xy = \frac{1}{2}(15) = 7\frac{1}{2}$ , which is less than 8.

Statement (2) is not sufficient. If one or both of the variables are positive, there's no way for  $xy$  to be greater than 8. However, if both  $x$  and  $y$  are negative, there's no limitation on the size of their values; for instance, if  $x = -3$  and  $y = -3$ ,  $xy = 9$ , which is greater than 8. Choice (A) is correct.

59. D

Explanation: Since the expression  $k - m$  always appears as a unit—that is,  $k$  and  $m$  never appear on their own, or in any other way, you can simplify each part of the question. Really, we're looking for a single variable; let's call it  $x$ , where  $x = k - m$ . Thus, (1) is  $x^3 = 8$ , and (2) is  $x^5 = 32$ .

Statement (1) is sufficient: there is only one number that, when raised to the third power, is 8. (This is only true when the power is odd; if the power were, for instance, 4, there would be a positive and negative result.)

Statement (2) is also sufficient. There is only one number that, when raised to the fifth power, is 32. Choice (D) is correct.

60. C

Explanation: To determine which quadrant the point is in, you need to know whether  $x$  is positive, and whether  $y$  is positive.

Statement (1) is insufficient: since the product of the two variables is positive, they must have the same sign, but you don't know what that sign is.

Statement (2) is also insufficient: if two numbers sum to a negative, it could be because they are both negative, or because one is negative and the other is positive.

Taken together, the statements are sufficient. (2) rules out the possibility that both variables are positive, and (1) leaves only one other option: that both are negative. Since both are negative, the point lies in quadrant III. Choice (C) is correct.

61. D

Explanation: Statement (1) is sufficient. Simplify by dividing by  $b$ :

$$\frac{ab}{b} = \frac{bc}{b}$$

$$a = c$$

If  $a$  and  $c$  are equal, then  $c$  cannot be greater than  $a$ . (One note: if we didn't know that  $b$  was positive, it would be possible that  $b$  is zero, and that  $a$  and  $c$  could be anything. However, given the stipulation in the question, that is ruled out.)

Statement (2) is also sufficient. Simplify by dividing by  $c$ :

6. EXPLANATIONS

---

$$\frac{ac}{c} = \frac{bc}{c}$$
$$a = b$$

Again, since two of the variables are equal, we know the answer to the question is "no." Choice (D) is correct.

62. B

Explanation: Statement (1) is insufficient: since the power is even, there are two possible values of  $b$ , 3 and -3.

Statement (2) is sufficient: since the power is odd, there is one possible value of  $b$ : 3. Choice (B) is correct.

63. A

Explanation: To answer the question, we'll need either the value of  $x + y$ , or the values of each of the variables.

Statement (1) is sufficient. Given  $xy^2$  and  $xy$ , we can find the value of  $y$ :

$$\frac{xy^2}{xy} = y$$
$$\frac{16}{-8} = -2$$
$$y = -2$$

Given the value of  $y$ , we can find the value of  $x$ :

$$xy = -8$$
$$x(-2) = -8$$
$$x = 4$$

With the values of both variables, we can solve the expression.

Statement (2) is insufficient. Given  $xy = -8$  and  $x - y = 6$ , you can solve for  $x$  and  $y$ :

$$xy = -8$$
$$x = 6 + y$$
$$(6 + y)y = -8$$
$$6y + y^2 = -8$$
$$y^2 + 6y + 8 = 0$$
$$(y + 4)(y + 2) = 0$$
$$y = -4 \text{ or } y = -2$$

In the first case,  $x = 2$ ; in the second,  $x = 4$ . The two solutions provide different answers, so the correct choice is (A).

64. D

Explanation: It's worth noting that, if you can find  $x + y$ , you can find  $\frac{x}{2} + \frac{y}{2}$ :

$$\frac{x}{2} + \frac{y}{2} = \frac{1}{2}(x + y)$$

Statement (1) is sufficient: given the value of  $x + y$ , you can find the expression we're looking for.

Statement (2) is also sufficient. Multiply both sides by 3, and the result is the same as (1):

$$x + y = 9$$

Choice (D) is correct.

6. EXPLANATIONS

---

65. E

Explanation: Statement (1) is insufficient. If we call the amount that Marvin paid  $m$ , the cost is expressed as:

$$3v + 4d = m + 7.25$$

There's no way to solve for  $2v + 2d$  from there.

Statement (2) is also insufficient:

$$v = m - 7.25$$

$$m = v + 7.25$$

Taken together, the statements are still insufficient. They can be combined, since both refer to the amount that Marvin paid:

$$3v + 4d = (v + 7.25) + 7.25$$

$$2v + 4d = 14.50$$

$$v + 2d = 7.25$$

We're looking for  $2v + 2d$  (or  $v + d$ ), so we can't find the answer. Choice (E) is correct.

66. C

Explanation: Statement (1) is insufficient: it tells us nothing relevant to the value of  $y$ . Statement (2) is also insufficient: we have the relationship between  $x$  and  $y$ , but nothing about  $x$  to help us solve for  $y$ .

Taken together, the statements are sufficient. Given the value of  $x$  in (1), we can plug that into the equation in (2) and solve for  $y$ . There's no need to do so, but recognize that if you had the time to do the calculations, you could find the value of  $y$ . Choice (C) is correct.

67. B

Explanation: Since both variables appear on both sides of the equals sign, start by simplifying:

$$2x + y + 1 = x - y$$

$$x + 2y + 1 = 0$$

$$x + 2y = -1$$

To find the value of  $x$ , then, you'll need the value of  $y$ .

Statement (1) is insufficient:  $y$  could be 2 or -2. Since there are two different values of  $y$ , there are two different resulting values of  $x$ .

Statement (2) is sufficient: if  $y = 2$ , we can solve for the value of  $x$ :

$$x + 2(2) = -1$$

$$x = -1 - 4 = -5$$

Choice (B) is correct.

68. D

Explanation: Statement (1) is sufficient. You may be able to recognize that by seeing that it simplifies to a linear equation with one variable; if not, it's not too time-consuming to solve:

$$\frac{1}{2x} = \frac{1}{16}$$

$$16 = 2x$$

$$x = 8$$

6. EXPLANATIONS

---

Statement (2) is also sufficient: again, it simplifies to a one-variable linear equation:

$$2x + 2 = 3x - 6$$

$$8 = x$$

Choice (D) is correct.

69. A

Explanation: Statement (1) is sufficient. While there are multiple numbers that are equal to their square (0 and 1), only one of those (1) is positive. Thus, since  $n$  is positive,  $n = 1$ .

Statement (2) is insufficient. Knowing that  $n^4 < 25$  limits the possible values of  $n$  to 1 and 2, which isn't good enough to answer the question. Choice (A) is correct.

70. C

Explanation: The equation in the question should look familiar: it's the pythagorean theorem. That equation holds if and only if the triangle is a right triangle.

Statement (1) is insufficient: it tells you that the triangle is isosceles—two of the sides and two of the angles are equal—but not the measure of the angles, or whether the third angle is a right angle.

Statement (2) is also insufficient: knowing the ratio of two sides of a triangle isn't enough to determine much of anything about it.

Taken together, the statements are sufficient. Since  $x = y$ ,  $a = b$ , which means that the three sides are related in the ratio  $2 : 2 : 2\sqrt{2}$ . That ratio should look familiar, as well: it's the ratio of the sides of a  $45 : 45 : 90$  (isosceles right) triangle. When you see that ratio, you know it's a right triangle. Choice (C) is correct.

71. C

Explanation: Statement (1) is insufficient: you can't find the value of  $y$  unless you first know the value of  $x$ .

Statement (2) is also insufficient: again, it relates two variables, and you don't know anything about either one.

Taken together, the statements are sufficient. Since  $x$  and  $y$  are integers, there are only a handful of possible pairs of numbers that multiply to 8: 1 and 8, 2 and 4, -1 and -8, and -2 and -4. Only one of those pairs contains one number that is the square of the other: 2 and 4. Thus,  $x = 2$  and  $y = 4$ . Choice (C) is correct.

72. C

Explanation: Statement (1) is insufficient, but we can note the given equation:

$$t = 2m - 5$$

Statement (2) is also insufficient, but offers another equation:

$$m = t - 4$$

6. EXPLANATIONS

---

Taken together, we have two linear equations and two variables, which is enough to solve for the two variables.

$$t = 2(t - 4) - 5$$

$$t = 2t - 8 - 5$$

$$-t = -13$$

$$t = 13$$

Choice (C) is correct.

73. B

Explanation: Statement (1) is insufficient, though it does offer a two-variable equation:

$$w = 2(t - 6)$$

where  $w$  is Willa's present age and  $t$  is Thomas's present age.

Statement (2) is sufficient: it's a linear equation with only one variable:

$$t = 1.5(t - 6)$$

$$t = 1.5t - 9$$

$$9 = 0.5t$$

$$t = 18$$

Choice (B) is correct.

74. A

Explanation: Statement (1) is sufficient. The only consecutive even integers that sum to 18 are 8 and 10. While we don't know which of the numbers corresponds to which of the variables, it doesn't matter: either way,  $wx = 80$ .

Statement (2) is insufficient: there are a wide variety of possible values of  $w$  and  $x$ , including 8 and 10 along with 5 and 13, which result in different answers. Choice (A) is correct.

75. B

Explanation: Statement (1) is insufficient:  $a + b$  could be either 2 or -2. Statement (2) is sufficient: add  $b$  to both sides and the result is:

$$a + b = 2, \text{ which directly answers the question. Choice (B) is correct.}$$

76. E

Explanation: Statements (1) and (2) are both insufficient on their own: they don't give you the relationship you're looking for, but instead compare one of the relevant variables to a third.

Taken together, the statements are still insufficient. Both  $x$  and  $y$  are less than  $z$ , but we're given no information about how  $x$  and  $y$  relate to each other. Choice (E) is correct.

77. D

Explanation: Statement (1) is sufficient. If  $x^3$  is negative,  $x$  must be negative; if  $x$  is positive,  $x^3$  is positive as well.

6. EXPLANATIONS

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Statement (2) is also sufficient. Solve by dividing each side by -3 and, since you're dividing by a negative, reversing the inequality sign:

$$-3x > 0$$

$$x < \frac{0}{-3}$$

$$x < 0$$

Choice (D) is correct.

78. A

Explanation: Statement (1) is sufficient. Recognize that  $x^2 - y^2 = (x + y)(x - y)$ , so when you multiply both sides of the equation by  $x - y$ , the result is directly relevant to the question:

$$(x + y)(x - y) = 1$$

$$x^2 - y^2 = 1$$

Statement (2) is insufficient. The only way to simplify that equation is to add  $y$  to both sides:

$$x + 2y = 3$$

That's not relevant to the question, so choice (A) is correct.

79. C

Explanation: Statement (1) is insufficient. It may be helpful to get rid of the fraction:

$$y = 2x - 2$$

Substituting into the inequality, we can ask:

$$\text{Is } x > 2x - 2 ?$$

$$\text{Is } 2 > x ?$$

Since we don't know whether  $x$  is less than 2, we can't answer the question.

Statement (2) is also insufficient: without any information about  $y$ , we can't find the relationship between the two variables.

Taken together, the statements are sufficient. (2) tells us that  $x$  is negative, and (1) tells us that the question is equivalent to "Is  $x < 2$  ?" If  $x$  is negative,  $x$  is less than 2, so the answer is "yes." Choice (C) is correct.

80. D

Explanation: Statement (1) is sufficient: it gives us the relationship between  $x$  and  $y$  and the relationship between  $x$  and  $z$ . Given those two, we can deduce the relationship between  $y$  and  $z$ , and find the ratio.

Statement (2) is similarly sufficient. Again, we have two relationships, this time between  $x$  and  $z$  (again) and  $y$  and  $z$ . Choice (D) is correct.

81. A

Explanation: Statement (1) is sufficient: subtract  $c$  from both sides:

$$b - c = 5$$

The question is answered directly.

Statement (2) is not sufficient: in this case,  $b - c$  could be either 5 or -5. Choice (A) is correct.



6. EXPLANATIONS

---

82. A

Explanation: Statement (1) is sufficient. If  $y > 4$ , the only way that  $xy < 4$  is if  $x$  is less than 1. If  $x$  is positive and less than 1,  $xy$  would be between 0 and 4; if it is negative,  $xy$  would be negative. In either case,  $x < 1$ .

Statement (2) is insufficient. Without any restriction on the value of  $y$ , it's possible that  $x$  is between 1 and 4, making the answer to the question "no." For instance, if  $y = -1$ ,  $x$  could be 3, and  $xy$  remains less than 4. And as we've seen working through (1), it's possible that  $x < 1$ , so a "yes" answer is possible. Choice (A) is correct.

83. A

Explanation: The question provides a two variable linear equation; it may be helpful to eliminate the fractions:

$$4p = 5q$$

Statement (1) is sufficient: we now have two linear equations with the same two variables. Solve for  $q$ :

$$q = 28 - 2p$$

Substitute into the original equation:

$$4p = 5(28 - 2p)$$

And solve for  $p$ . (On the test, there's no need to go even this far.)

Statement (2) is insufficient. To answer the question, you need an equation, not merely an inequality. Choice (A) is correct.

84. A

Explanation: Perimeter is given by  $2l + 2w$ , so we know that  $2l + 2w = 160$ , or  $l + w = 80$ .

Statement (1) is sufficient: we're given another equation with the same two variables:

$$l = 3w$$

Substitute that into the first equation, and you can solve for  $w$ :

$$3w + w = 80$$

$$4w = 80$$

$$w = 20$$

$$l = 3w = 3(20) = 60$$

Statement (2) is insufficient. If the area is 1200,  $lw = 1200$ . Knowing that, in addition to  $l + w = 80$ , is enough to find the dimensions of the lot (20 and 60), but there's no way to know which is which. This is the case when all of the equations contain nothing but multiplication and addition. Choice (A) is correct.

85. C

Explanation: It may be more useful to think of the initial equation as  $10xn = t$ .

Statement (1) is insufficient: without the value of  $n$ , you can't solve for  $t$ .

Statement (2) is also insufficient; to solve for  $t$ , you need the value of each of the two variables, not just the relationship between them.

6. EXPLANATIONS

---

Taken together, the statements are sufficient. If  $5x = 30$ ,  $x = 6$ . If  $x = 6$ ,  $n = 2$ . Thus,  $10xn = 10(2)(6) = 120$ . (C) is the correct choice.

86. C

Explanation: Statement (1) is insufficient: it says nothing about  $z$ .

Statement (2) is also insufficient: it provides a relationship between three numbers, but no way to determine the value of any of them.

Taken together, the statements are sufficient. (2) gives us an equation:

$$\frac{x+y+z}{3} = 8$$

$$x + y + z = 24$$

Substitute the information from (1):

$$(8) + z = 24$$

$$z = 16$$

Choice (C) is correct.

87. C

Explanation: To answer the question, we need to know the color breakdown of the 7 buttons that were removed.

Statement (1) gives us a relationship, but not enough information. If the difference in number is 1, that means that 4 of one color and 3 of the other color were removed. However, we don't know which is which.

Statement (2) is also insufficient. We know that at least 4 of the removed buttons were brown, but that means any number between 4 and 7 could've been brown.

Taken together, the statements are sufficient. (1) tells us that the number of brown buttons removed must be 4 or 3. (2) says that at least 4 brown buttons were removed. Thus, 4 brown buttons were removed, which means that 8 brown buttons (12 minus 4) remain. Choice (C) is correct.

88. A

Explanation: Statement (1) is sufficient.  $j$  and  $j^3$  always have the same sign, so if  $j^3$  is positive,  $j$  must be positive as well.

Statement (2) is insufficient. When a number is squared, the result is always positive. Thus, (2) isn't telling us anything:  $j$  could be positive or negative. Choice (A) is correct.

89. A

Explanation: Statement (1) is sufficient. Move all the terms to one side, and the result is a binomial:

$$a^2 - 2a + 1 = 0$$

$$(a - 1)(a - 1) = 0$$

$$a = 1$$

Statement (2) is insufficient:  $a$  could be either 1 or -1. Choice (A) is correct.

90. C

Explanation: It may be worthwhile to rewrite the question:

6. EXPLANATIONS

---

$$xy - x - y + 1 = 1 ?$$

$$xy - x - y = 0 ?$$

Statement (1) is insufficient: if we substitute 1 for  $xy$ , we're still left with an unanswerable question:

$$1 - x - y = 0 ?$$

Statement (2) is also insufficient, but is also relevant to the question. If  $x + y = 1$ , then  $-x - y = -1$ , so we can plug that into the question as well:

$$xy - 1 = 0 ?$$

Taken together, the statements are sufficient.  $xy = 1$  and  $-x - y = -1$ , so:

$$1 - 1 = 0 ?$$

$$0 = 0 ?$$

The answer is "yes." Choice (C) is correct.

91. E

Explanation: Statement (1) is insufficient: we're looking for a weight, and the statement only gives us a relationship between weights.

Statement (2) is insufficient for the same reason: it gives us a relationship between weights, but no actual weights to work with.

Taken together, the statements are still insufficient. In fact, (2) is just a wordier version of (1): each provides the relationship between the weights of the small and large buttons. Without some weight to work with, we'll never find the total weight. (E) is the correct choice.

92. E

Explanation: Statement (1) is insufficient: if  $x < 0$  and  $x + y + z > 0$ ,  $y + z$  must be positive, but without any information about  $y$ , we can't answer a question about  $z$ .

Statement (2) is also insufficient. As in (1), we can determine that  $x + z$  must be positive, but without any information concerning  $x$ , we don't know about  $z$ .

Taken together, the statements are still insufficient. Since  $x$  and  $y$  are both negative,  $x + y$  must be negative. Thus, if  $x + y + z$  is positive,  $z$  must be positive, and  $z$  must be greater than the absolute value of  $x + y$ . However, that doesn't tell us whether  $z$  is greater than 1, just that  $z$  is positive. If  $x + y = -\frac{1}{8}$ ,  $z = \frac{1}{4}$ , in which case the answer is "no." For the same value of  $x + y$ ,  $z$  could be greater than 1, as well. Choice (E) is correct.

93. C

Explanation: Statement (1) is insufficient: the relationship between the two variables doesn't give us the values of the variables.

Statement (2) is insufficient for the same reason. We're given a single relationship and no values.

Taken together, the statements are sufficient. Write each statement in terms of  $x^2$ :

$$x = y^2$$

$$x^2 = y^4$$

6. EXPLANATIONS

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And statement (2):

$$y = \left(\frac{x}{8}\right)^2$$

$$y = \frac{x^2}{64}$$

$$x^2 = 64y$$

Combine the two:

$$y^4 = 64y$$

$$y^3 = 64$$

$$y = 4$$

We're looking for  $x$ , and can use either of the statements to give us that. Choice (C) is correct.

94. E

Explanation: The question gives you one equation with three variables:

$$c + n + w = 48$$

To find the value of one of those three variables, you'll need two more linear equations using some or all of those variables.

Statement (1) looks like a linear equation, but really isn't: it isn't clear whether  $c - n = 12$  or  $n - c = 12$ . Without clarification, that doesn't help at all.

Statement (2) is also insufficient, though it does provide a linear equation:  $n = w$ .

Taken together, the statements are still insufficient. While (2) offers a linear equation, (1) does not, and without three distinct linear equations, we can't solve for the three variables. Choice (E) is correct.

95. C

Explanation: Statement (1) is insufficient.  $\frac{y}{z} > 0$  indicates that  $y$  and  $z$  have the same sign, and  $\frac{x}{y} < 0$  indicates that  $x$  and  $y$  have different signs, but since we don't know the sign of either  $x$  or  $y$ , we can't use that information to find the sign of  $z$ .

Statement (2) is insufficient: we don't have any information to relate  $x$  to  $z$ .

Taken together, the statements are sufficient. If  $x < 0$  and  $\frac{x}{y} < 0$ , then  $y > 0$ . If  $y > 0$  and  $\frac{y}{z} > 0$ , then  $z > 0$ . Choice (C) is correct.

96. E

Explanation: Statement (1) is insufficient: multiply both sides by 2, and the result is:

$$r - s = 10$$

There's no way to get from there to the value of  $r + s$ .

Statement (2) is also insufficient, and provides the exact same information. Multiply both sides by 2, and the result is:

$$r - s = 10$$

Not only is that insufficient, but since it's the same as (1), there's no way that the statements combined can be sufficient. Choice (E) is correct.

97. E

6. EXPLANATIONS

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Explanation: Statement (1) is insufficient. It is true if  $y = 3$  or  $y = 6$ . (The least common multiple of 2 and  $y$  is 6 if  $y$  is either 3 or 6.)

Statement (2) is also insufficient: there's no relationship given between  $x$  (which we know the value of) and  $y$  (which we're looking for).

Taken together, the statements are still insufficient. The least common denominator of  $\frac{x}{y}$  and  $\frac{1}{2}$  is 6 whether  $\frac{x}{y} = \frac{1}{3}$  or  $\frac{x}{y} = \frac{1}{6}$ —in other words, knowing that the value of  $x$  is 1 doesn't affect the possible values of  $y$ . Choice (E) is correct.

98. B

Explanation: First, rearrange the equation to solve for  $k$ :

$$k = p - q$$

Statement (1) is insufficient: while you're given the value of  $q$ , there's nothing about  $p$ , which is necessary.

Statement (2) is sufficient: you can simplify as follows:

$$2p - 2q = -8$$

$$p - q = -4$$

Since  $k = p - q$ ,  $k = -4$ . (B) is the correct choice.

99. E

Explanation: Algebraically, the question is asking for the value of  $n$  is the equation  $n = 0.3x$ . To find that, the value of  $x$  would be most useful.

Statement (1) is insufficient. We can find the value of  $x^2$ :

$$220 = (1.1)(2)x^2$$

$$x^2 = 100$$

But, as with any equation involving a variable squared, there are two possible values for  $x$ . Thus, there are two possible results for  $n$  as well.

Statement (2) is also insufficient, for the same reason:

$$\frac{3}{5}(\frac{1}{2}x^2) = 30$$

$$\frac{3}{10}x^2 = 30$$

$$x^2 = 100$$

Again, we don't know whether  $x$  is positive or negative.

Taken together, the statements are still insufficient. Both statements allowed us to solve for the value of  $x^2$ , but without knowing whether  $x$  is positive or negative, we can't find the value of  $n$ . Choice (E) is correct.

100. A

Explanation: Statement (1) is sufficient. It may be useful to simplify first, dividing both sides by 5:

$$x > 2x$$

If  $x$  is positive,  $2x$  will always be greater than  $x$ . Thus, if  $x > 2x$ ,  $x$  must be negative.

Statement (2) is insufficient. Simplify to isolate  $x$ :

$$x + 5 > 0$$

$$x > -5$$

6. *EXPLANATIONS*

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$x$  could be negative, but it could also be any positive number. Choice (A) is correct.